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GEOGRAPHICAL RECORD

AMERICA

Protection of the Grand Canyon of the Colorado. This canyon in Arizona is now acknowledged to be one of the most astonishing sights of the world, and the greatest example of direct erosion to be found. The region including this enormous gorge constitutes what has been termed the "Geologist's Paradise," for the book of the earth's crust here opens to him its varied pages in a most extraordinary way. Bare edges of strata of thousands of feet are exposed for hundreds of miles; giant faults show themselves in numerous places; and all manner of geologic marvels are revealed. Of no less interest is it to the geographer, the botanist, the artist, the tourist, to everyone.

Realizing this, action from time to time has been taken by the government to protect and preserve the canyon for all the people. But probably through a misunderstanding of its magnitude up to the present, only a portion has been protected. This fact led the American Scenic and Historic Preservation Society recently to name a committee, consisting of Dr. George F. Kunz, President of the Society, Mr. W. B. Howland, Dr. Edward Hagaman Hall, and Mr. F. S. Dellenbaugh, who was one of Major Powell's companions in the exploration of the country, to take up the matter and to urge the extension of the reservation. By appointment, this committee called on President Taft on November 3 to lay before him the facts in the case.

The committee asked the President to withdraw enough of the public domain to include the whole of the chasm, from the head of Marble division to the Grand Wash, the end of the Grand Canyon division. He expressed himself as being entirely in sympathy with the project, saying also that the region ought to be a national park, that the creation of such a park is mainly now a question of method, and that he would bring it to the attention of Congress at an early date.

The lands to be withdrawn being extremely arid and rocky, with no settlements, and lying wholly within the Territory of Arizona, the question is not a difficult one. The magnitude of the canyon thus to be preserved is such that the Yosemite, the Yellowstone Canyon, Niagara Falls, Mt. Washington, and several other scenic treasures, all at one time could be scattered along its length and lost within it, for including the Marble Canyon division the continuous chasm, as the river runs, is 283 miles long, with a depth for many miles of from 5,000 to 6,000 feet and a width at the top of from less than one, to twelve or fifteen miles. The average depth is about 4,000 feet. The fall of the Colorado river in this distance is more than 2,300 feet, over a series of powerful rapids. Every tributary enters the main gorge through one of its own, hardly less majestic, and the proposed National Park would include a large part of some of these great side canyons.

The Hudson Bay Railroad. It is understood that the actual construction of the Hudson Bay railroad will begin next spring. *Canada* says that the contract for the construction of a bridge over the Saskatchewan River at the Pas Mission, about 52° 40′ N. Lat., has been awarded. The railroad has now reached this point and at the north end of the bridge, the building of the western end of the Hudson Bay R.R. will begin. It is about 90 miles west of the north end of Lake Winnipeg and nearly as far north. The railroad will extend from the Pas Mission to Port Nelson or Port Churchill, from 400 to 500 miles.

ALASKAN EARTHQUAKES OF 1899. In 1905 Tarr and Martin investigated the striking evidence of changes in the coast line of Yakutat Bay during the earthquakes of September, 1899. During the preparation of their full report upon this evidence, the junior author, Prof. Martin, sought information concerning the area affected by the earthquake and its associated phenomena in regions beyond the area of field work. In a recent article (*Bull.* Geological Society of America, vol. 21, 1910, pp. 339-406), Prof. Martin has presented an outline of the results of this investigation. He finds that the greatest of the earthquakes, that of Sept. 10, was felt by observers in all places within a radius of 250 miles of Yakutat Bay, and at isolated points even at a distance of 480 miles. About 216,300 square miles of land were affected by shocks sensible to casual observers; and if it may be assumed that an equal area of the Pacific to the west of Yakutat Bay was also affected, the minimum area of disturbance was 432,500 square miles. A possible maximum shaken area of 1,539,000 square miles would be deduced if the radius were extended out to the regions where isolated observers have reported the shock. The earthquake, therefore, ranks high among the notable earthquake shocks of North America. For example, the California earthquake of 1909 was felt throughout an area of only 372,700 square miles. No life was lost, however, in this unsettled region, and no notable damage was done to buildings. Besides the interesting and important discussions of details concerning this earthquake and a study of seismographic records from stations all over the earth, Prof. Martin gives a list of the known earthquake shocks of Alaska as far as he has been able to obtain it. This list will be of importance in future studies of Alaskan earthquake phenomenon, and the article itself is a distinct contribution to the subject. R. S. T.

THE PAN-AMERICAN R.R. The British Minister at Buenos Aires reports (*Bd. of Trade Journ.,* Oct. 20, 1910) that the Pan-American Conference there resolved that the construction of the Pan-American R.R. should be left in the hands of the Pan-American R.R. Committee at Washington, which is advised to prepare a definite plan so that the line may be completed at the earliest possible date. The total length of the line from New York to Buenos Aires will, it is estimated, be 10,116 miles. The northern part of the line is now in operation from New York, through the City of Mexico to the northern frontier of Guatemala, 3,869 miles. The completed links in the line farther south, reduce the mileage still to be constructed to 3,700.

AFRICA

LIBERIA CONNECTED WITH THE GERMAN CABLE SYSTEM. On March 21, the extension of the Emden-Teneriffe cable was landed at Monrovia, the capital of Liberia. This is Germany's first cable connection with Africa. It is expected that the cable will be extended farther south to the German colonies of Togo and Cameroons.

PROGRESS IN SOUTHERN RHODESIA. A paper in *United Empire* (vol. I, No. 10, Oct., 1910) informs us that the Liebig Company is buying a ranch of 400,000 acres, to be stocked within five years, with cattle from which Liebig products will be prepared. This seems to show that experts have concluded that stock-raising is now a safe enterprise in Rhodesia, although the pastoral industry has been retarded by the various cattle diseases which afflicted South Africa for years. The agricultural possibilities also are large and much is expected from tobacco and maize. It is not a country for the man without means, as a certain amount of capital is essential for successful farming. Rhodesia is now contributing a good deal of gold, the product amounting to $13,750,000 in 1909. The ore is of a quality that yields the best result from economical and individual working. Of the 145,000 square miles of Southern Rhodesia, three-fourths has an elevation of 3,000 feet and one-fourth, 4,000 feet above sea-level, so that the excellent climate makes the land a white man's country.

PYGMIES IN THE SOUTHERN PART OF THE KASAI BASIN. Mr. E. Torday, the Hungarian explorer, gave, on March 7, before the Royal Geographical Society, an account of the admirable work he has done in ethnology in the Kasai Basin (*Geogr. Journ.*, vol. 36, No. 1, 1910). He found that each chief in a large region south of the Sankuru River had under his suzerainty a small group of pygmies who hunt for him while he provides them with vegetable food in exchange for their game. One group, abandoning the nomadic life, has constructed a small village and taken to agriculture. This is, perhaps, the first instance of the kind on record. Mr. Torday makes this rather startling statement:

"Only two generations have passed since they left the forest, and they have already lost their pygmy appearance. Though not as big as the Bushongo, they have attained a stature far superior to that of the average pygmy. As intermarriage between Bushongo and these 'half ghosts' (which they are considered to be) is out of the question, it must be admitted that sunshine, air and regular life have been the main factors in this change." He also points out, what seems to be a parallel phenomenon, that, as a rule, the forest people are somewhat short in stature, but those who live in the open, cultivated clearings in the forest increase in stature.

THE LOWER CONGO R.R. Mr. H. G. Mackie, British Consul at Boma, reports that an electrical engineer has arrived there in connection with the proposed electrification of the railroad between Matadi and Leopoldville (140 miles) by utilizing the hydraulic power of the Congo cataracts which the railroad circumvents. The traffic on this line is steadily increasing, the most notable feature being the transport of large quantities of material for the upper Congo railroads, now under construction, as well as for the projected line in French Equatorial Africa (formerly The French Congo). All vessels arriving at Boma are heavily laden and several extra steamers are now in the service.

SECOND AFRICAN EXPEDITION OF PRINCE ADOLF FRIEDRICH OF MECKLENBURG. This expedition started for Africa from Hamburg on July 9. Its purpose (*Geogr. Zeitsch.*, vol. 16, No. 9, 1910), is to explore the boundary regions between the Cameroons and French Equatorial Africa (formerly the French Congo), and especially the very large and partly unknown areas of the numerous tributaries that join the Congo on its right bank. A visit to Lake Chad is also planned. Lieut. von Wiese, under the Prince, will lead the expedition, and the scientific members are Prof. Dr. Haberer, Dr. Schulze, Dr. Schubotz and Dr. Mildbrand. Mr. Heims is the artist. Scientific societies of Hamburg and Frankfurt contributed over $100,000 towards the expenses. The party is expected to be away about fifteen months.

ASIA

KOREA ANNEXED BY JAPAN. A treaty was signed between Japan and Korea on Aug. 22 by which Japan acquires sovereign rights over the peninsula, which ceases to exist as a state and becomes a part of the Japanese Empire under the name of Chosen. Japan abolishes the consular courts but continues without change for ten years, all the commercial rights that foreigners have enjoyed.

DISCOVERIES IN NORTH WEST MONGOLIA. A short report which Mr. Douglas Carruthers has sent to the *Geographical Journal* (Oct., 1910) seems to show that he has already accomplished some excellent work in this part of the Chinese Empire. His expedition started, early this year, for the extreme upper basin of the Yenesei. Leaving Minusinsk on the upper Yenesei in May, he traversed the Saiansk and Beikem districts and discovered that the supposed main range of the Saiansk Mts., which appears on the maps as the boundary, in that region, between Siberia and Mongolia, does not exist. Its place is taken by isolated groups of very rough, rugged mountains, apparently a series of disconnected uplifts which occurred in different directions and at different periods. This Mongolian region has a strong affinity with Siberia, not Mongolia. The climate, scenery, people, flora and fauna are all Siberian. Almost imperceptible water-partings divide the river systems, and many glacial lakes not shown on the maps were discovered. Dense forest covers most of the surface and the dry Mongolian flora begins to appear only in the valley bottoms and southern slopes of the hills around Cha-kul. In the heart of the forest are nomads living in birch-bark wigwams and depending for subsistence on their domesticated reindeer. This animal was also found wild, proving that the reindeer is indigenous in this part of the Chinese Empire. As the maps are very inaccurate, the party made a careful survey of the whole route through the upper Yenesei region, some 1,800 square miles being mapped.

POLAR

NORWEGIAN EXPLORATIONS IN SPITZBERGEN. The *London Times* of Oct. 7 contained an account of the recent explorations in this archipelago by Capt. Gunnar Isachsen's expedition which returned to Christiania on Sept. 18. The land work was done chiefly in the northwestern part of the main island, and the most striking result was the discovery of a not long extinct volcano and hot springs in Bock Bay, a branch of Wood Bay. The details seem to prove that the volcanic cone is at least of Quaternary age and later than the general glaciation of the region. The cone, about 1,650 feet high, is described as consisting partly of lapilli. It is in the neighborhood of a north-south fault that brings Devonian sandstones into juxtaposition with granite. The ice conditions were unusually difficult. Bell Sound, in the south-west of the island, was blocked with ice before the end of August and hunting sloops are now there frozen up.

CLIMATOLOGY

HAS THE CLIMATE OF INDIA CHANGED? Meteorologists the world over seem to have caught the fever of an interest in climatic oscillations, or changes. This is, doubtless, the natural result of the numerous recent publications coming from geographers and travelers in different regions, in which reference is made to the evidence, or supposed evidence, of climatic fluctuations. Dr. Gilbert T. Walker, Director-General of Indian Observatories, has lately become a contributor to this widespread discussion. In Vol. XXI, Part I, *Indian Meteorological Memoirs* (Calcutta, 1910), Dr. Walker publishes a report on "The Meteorological Evidence for Supposed Changes of Climate in India." It is to be noted that this concerns the *meteorological* evidence, *i. e.,* evidence based upon the records obtained by means of meteorological instruments, and does not deal with physiographic or with traditional evidence. There is much confusion on the part of many writers in their understanding, and in their use of the various kinds of evidence, just as there is confusion as to the relative value of this evidence.

The weakness of the monsoon in northwestern India since 1894 has given rise to conjectures that the climate of that region had altered permanently, and this (supposed) alteration has been explained, at various times, as being due to an increase of irrigation, or to a decrease in forest cover. The Indian Government requested that a report be prepared upon this question, and this was done in January, 1908. The general interest in the matter led to the publication of this report, with the additional evidence given by the data for 1908.

The observations used were carefully selected for their accuracy, and the results are plotted in a series of curves. It appears that there is no proof of any permanent climatic change, but there has been a tendency over a large part of northwestern and central India for the rainfall during the past thirty years to increase to a maximum between 1892 and 1894; to sink to a minimum in 1899, and to improve slowly since that time. The recent deficiency of monsoon rainfall must be attributed to something abnormal in the larger movements of the atmosphere, and not to human agency. The deficiency has not lasted long enough to justify the conclusion that there has been a permanent change of climate. And there are marked indications of a return to good seasons.

R. DEC. W.

A NEW CLASSIFICATION OF CLIMATES. Many suggestions as to a classification of climates have been made in recent years. It is beginning to be difficult to keep the various different schemes in mind. Those who wish to gain a general idea of the classifications proposed up to the year 1906 may refer to "The Classification of Climates, II," (*Bull.* Amer. Geog. Soc., Aug., 1906, pp. 465-477), where maps are also given. Within the past year two new schemes have been suggested, one by de Martonne in "Traité de Géographie physique" who, following about the same lines as Köppen, proposes thirty climates; and the other, a still more recent one, by Penck, "Versuch einer Klimaklassifikation auf physio-geographischer Grundlage" (*Sitzungsber.* k. preuss. Akad. Wiss., phys-math. Cl., 1910, XII, Mar. 3, pp. 236-246). Penck calls attention to the fact that several of the more recent classifications involve an exact knowledge of the individual climatic elements, necessitating long series of meteorological observations. In other words, as most of those who have tried to employ these classifications will agree, they are too complex for general use. For this reason Penck finds in the general conditions of precipitation and in the relations of the land surface to precipitation a simpler and a more rational basis for climatic subdivision so far as the land areas of the world are concerned.

There are three main climatic provinces: I. *humid,* in which there is more precipitation than can be removed by evaporation so that there is an excess in the form of rivers; II. *snow* ("nivales Klima"), in which snow falls in excess of the processes of removal, so that there is transportation by glaciers; III. *arid,* where evaporation eliminates all the precipitation, and could dispose of still more. Here, therefore, water flowing in from outside can be evaporated. These three principal divisions are separated by two important limits. One of these is the *snow-line;* the other is designated as the *dry-line* ("Trockengrenze"), *i. e.,* the boundary between the humid and arid climates. The "Trockengrenze" is obviously a broader or narrower band, rather than a line.

In the humid climate there are two subdivisions, that with frozen soil and that with ground water. The latter is further subdivided according to the distribution of rainfall, whether this is uniform throughout the year, or irregular. When there is a regular alternation of arid and humid conditions we have the *semi-humid* province (with tropical, subtropical and monsoon districts). Where the distribution of rainfall is uniform we have the *full-humid* ("Voll-humide") province (with equatorial and temperate subdivisions). Similarly, the arid group of climates is subdivided into two provinces, (1) in which aridity prevails throughout the year, or (2) only in certain seasons (fully arid, semi-arid). The *snow* province has a subdivision where snow alone falls ("Vollnivale Provinz") and where rain occasionally falls ("Semi-nivale Provinz").

Professor Penck's scheme commends itself because of its rational basis, and by reason of its simplicity. It will doubtless meet the wishes of many geographers who have been loath to adopt schemes of climatic classification whose meteorological or climatological basis was very complex. R. DeC. W.

British Rainfall Organization. The British Rainfall Organization, initiated by the late George J. Symons in 1860, and after his death, in 1900, carried on by Dr. H. R. Mill, has, this year, been vested in a body of trustees. This step ensures the continuance of this most important organization for the future. Unique among meteorological organizations, this rainfall service has for years done a work for meteorology and climatology whose value it is impossible to overestimate. Mr. Symons devoted himself heart and soul to the establishment and development of this, his pet and peculiar hobby. Dr. Mill, for the last ten years, has earned the gratitude of his fellow workers in science the world over for undertaking the difficult and responsible task of carrying on the organization. Dr. Mill deserves the further gratitude of meteorologists for ensuring the permanence of the undertaking, and may well be congratulated on the successful establishment of this splendid service on a sure foundation. R. DeC. W.

PHYSICAL GEOGRAPHY

Origin of Coral Reefs. In a very suggestive article (*Amer. Journ. of Sci.*, vol. 30, 1910, pp. 297-308), Professor R. A. Daly undertakes to show a possible connection between the development of coral reefs and the presence of glaciation in the northern and southern hemispheres. He shows that atolls and other coral reefs rest on a shallow plateau with an average depth of about 45 fathoms. A possible explanation of this plateau is marine erosion, but a difficulty in the way of this hypothesis is the defence which the reefs themselves offer against the attack of the waves and currents. If, however, the climate were cooler, reef building corals could not flourish in many parts of the ocean where they are now living. Professor Daly suggests that such a condition may have existed during the glacial period, and that during this time, which may have had a duration of from 300,000 years to 1,000,000 years, many of the lower islands of the open ocean were planed off, while the higher islands were notched, in both cases giving platforms on which coral growth could take place.

To account for planation at a depth as great as 45 fathoms, Daly assumes a lowering of the sea level through the withdrawal of water for incorporation in the great ice caps of the two hemispheres. Assuming an average thickness of ice of 3,000 feet, there would be a lowering of the ocean's surface of about 125 feet, and by the gravitative attraction of the ice there would be a lowering of the level of the equatorial sea about 30 feet more. Taking the area of ice cover as 6,000,000 square miles, and the average thickness of the ice as 3,600 feet, the shift of level of the equatorial sea would be about 30 fathoms. This coincides quite well with the depth of the coral reef platforms and of the lagoons and channels in atolls. It also explains the presence of submerged valleys on the islands that rise above fringing reefs, whose depth never seems to exceed 45 fathoms. These valleys are assumed to be the work of land streams, submerged as the sea level rose with return of water during the disappearance of the ice caps.

Students of coral reefs have brought forth many facts which make it difficult to accept the current theories, either the Darwin-Dana theory, or the Murray theory. This suggested explanation of Daly seems to meet the objections that have hitherto been raised to current theories, and its elaboration will be watched with interest. R. S. T.

NATURAL BRIDGES. It has been a common custom to consider natural bridges as mainly solution phenomena and as associated in the main with phenomena of caverns. It is, therefore, of distinct interest to read the thorough discussion of the subject of the origin of natural bridges presented in an article by Prof. Cleland (*Bull. Geolog. Soc. of Amer.*, vol. 21, 1910, pp. 313-338). This article considers the subject under several headings based upon differences in origin, and in each case it is shown first, how a natural bridge can originate in that manner, and then individual instances are discussed, and many of the cases are illustrated by half-tones. From the analysis of origin and individual instances, Prof. Cleland concludes that natural bridges occur in both glaciated and unglaciated regions, that they are necessarily short-lived structures, and that they are formed in materials of various kinds, including limestone, sandstone, marble, gypsum, conglomerate, marl, clay, shale, schist, and lava. They may be developed in any stage of erosion from youth to early old age, and it is unsafe to make a statement as to the origin of a natural bridge without a careful field study. He recognizes five well-marked divisions on the basis of origin, some of them with several subdivisions. These subdivisions are as follows: (a) By deposition, for instance by the deposit of travertine, or of snow or avalanches across stream courses; (b) by gravity, as when a stone is wedged in a narrow chasm; (c) by wave action differentially eroding along sea or lake coasts; (d) by solution in which seepage, the caving in of superficial tunnels, and the combined action of subaërial and subterranean erosion are the main elements; and (e) by stream erosion. The better known natural bridges of the United States are due to processes operating under one of the two last divisions, the Virginia Natural Bridge, for instance, being the result of solution by seepage, certain Florida and New York bridges resulting from the partial caving in of superficial tunnels, and an extensive series of natural bridges being the product of stream erosion in one form or another. Among the latter causes one of the most interesting is the perforation of the neck of an incised meander, during which the stream, eating out its bank from both sides, actually undercuts the narrow neck until a natural bridge is formed. Such seems to be the case with at least some of the remarkable natural bridges recently discovered in southeastern Utah.

R. S. T.

GENERAL

Honors. The Royal Scottish Geographical Society will award its medal to Prof. James Geikie for his numerous contributions to geographical research and his great services to the society; and the Livingstone gold medal to Sir John Murray for his oceanographical work and to commemorate the completion of the bathymetrical survey of the Scottish freshwater lochs.

Consumption of Nitrate. A Reuter despatch from Santiago, Chile, says that the world's consumption of nitrate, during the past year, amounted to 43,996,996 quintals (about 2,200,000 tons), an increase of about 8,000,000 quintals as compared with the previous twelve months.

Geography and Geology at the Buenos Aires Congress. This Congress was one of the features of the celebration of the centenary of the Revolution of May 25, 1810, and was held in Buenos Aires on July 11-25 last, under the auspices of the Argentine Scientific Society. According to the summary in *Nature* (Oct. 20, 1910), the principal papers in the Geography and Geological section related to Argentina, Chile and adjoining countries. Engineer Luis Riso Patron, Director of Land Surveys in Chile, read a paper on the development of geographical and geodetic work in that country, Prof. Codazzi one on mining in Colombia, Señor Maurtúa spoke on geographical work in Peru, Engineer Machado on petroleum in Chile, Engineer Hermitte and Lieut.-Col. Romero on petroleum in Argentina, and the topography and mineralogy of the Andes were treated in various papers.

The Argentine Meteorological Office presented many interesting papers, chiefly on the meteorology of Argentina and the southern ocean. Its director, Dr. Davis, spoke on the temperature of Argentina as compared with other countries. Prof. Clayton described a new method of forecasting which promises to cover longer periods than is now possible. Profs. Mossman and Solyom spoke, respectively, on the effect of the antarctic currents upon the weather of South America, and the cyclones and anti-cyclones of the South American continent. Dr. Knoche described the organization of the meteorological service of Chile, and Dr. Montessus de Ballore read a paper on a convention of the seismological services of Chile and Argentina. Dr. Negri treated of two seismical laws discovered by himself.

Islands whose Existence is Doubtful. At the meeting of the British Association in September, at Sheffield, Capt. J. K. Davis described the research voyage undertaken by him in the *Nimrod* (May-July, 1909), under instructions from Lieut. Shackleton to try to locate certain islands in the South Pacific shown on the charts. The results of the voyage show that the Royal Company islands, the Nimrod islands and Dougherty island are not in the neighborhood of the positions assigned to them and it is probable that they may safely be taken off the charts. The places where they have been shown on the charts are: Dougherty I., 59° S.—120° 15′ W.; Nimrod Is., 56° S.—159° W.; Royal Co. Is., 50° S —140° E.